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CLIMATE CHANGE PERSPECTIVES FROM THE FISH THERMAL NICHE AND FROM LONG-TERM, LAKE ICE DYNAMICS

Magnuson, John J.

Center for Limnology, University of Wisconsin-Madison, Madison WI 53706 USA

My perspectives on climate change come largely from two personal views – one as a fish and fisheries ecologist with an autecological interest and the second as a limnologist interested in long-term dynamics and change. Ideas about the thermal niche evolved from F. E. J. Fry's (University of Toronto) paradigm of fish response to environmental factors. Ideas about climatic change and variability have been shaped by Lake Mendota, Wisconsin, signaling through my office window. The history of each set of ideas, i.e., the thermal niche of fishes and the learning from nature's long-term dynamics are briefly reviewed as applied to climatic change.

THE RELATIONSHIPS BETWEEN TEMPERATURE CHANGES AND REPRODUCTIVE INVESTMENT IN THE GRASS GOBY *ZOSTERISESSOR OPHIOCEPHALUS* (PALLAS, 1811)

Malavasi, S.¹, Zucchetta, M.¹, Cipolato, G.¹, Antonetti, P.², Pranovi, F.¹, Franzoi, P.¹, Torricelli, P.¹

¹Department of Environmental Sciences, University Ca' Foscari of Venice, Campo della Celestia, Castello 2737/b, I-30122 Venice, Italy

²Veterinary service, Fish market/A.S.L. 12, Tronchetto, I-30125 Venice, Italy

The assessment of climate change impacts on fish phenology is a relevant task within the framework of the analysis of global warming effects on exploited animal populations. In this study, the relationships between water temperature changes and reproductive investment in an estuarine fish species, the grass goby *Zosterisessor ophiocephalus* (Pallas, 1811), were investigated on a temporal scale of a decade in the Venice lagoon. The reproductive cycles of five different years (2000, 2001, 2007, 2008 and 2009) were obtained from the monthly variation of Gonado-somatic Index (I_G) in adult males and females of the species, with the aid of local fishery. The reproductive investment corresponding to the seasonal increasing phase until the peak, i.e. from October to April, were related to the thermal "anomalies", calculated as the deviations from the mean water temperature observed on the period 1999-2009. Results showed that the higher levels of reproductive investment were observed in relation to the higher degree of "positive" thermal anomalies, that is during the warmest annual periods preceding the breeding season peaks. During these periods, a tendency to a slight anticipation of the breeding season peak was also observed in some cases. Since the grass goby is a target species of the artisanal small-scale fishery of the Northern Adriatic lagoons, the use of long term series of reproductive investment matched with water temperature data, could provide a tool to assess and forecast, also on the basis of simulations, the impact of warming on the stocks.